the United States, provided with adequate technical service personnel and facilities for prompt, efficient handling of all repairs of this equipment.

At the request of the DISTRICT, any Bidder may be required to furnish evidence satisfactory to the DISTRICT that the Bidder has the necessary experience, facilities, ability, and financial resources to perform the Contract.

E. BIDDER'S QUESTIONS

Should the Bidder have questions concerning the Contract Documents, they shall direct their questions to: _____

Karla Tremel, ~~Procurement Specialist~~ Procurement Manager
~~Supply Chain Manager, at~~
~~(402) 563-~~ 402-563-5457 ~~(phone), by fax at~~
(402) ~~563~~-5034 (fax), ~~or by~~
e-mail: ~~at~~ kjtreme@nppd.com.

or

Bob Nitsch
~~Gerald Gentleman Station Plant~~ Project Engineering Leader
(phone) 308-386-5312
(fax) 308-386-5275
e-mail: bbnitsc@nppd.com

(NPPD to confirm or provide missing info)

F. AWARD AND EVALUATION

The Contract will, as hereinafter set out, be awarded to the responsible Bidder submitting the lowest and best bid which complies with these Contract Documents provided their bid is reasonable and it is to the interest of the DISTRICT to accept. The DISTRICT, however, reserves the right to reject any and all bids and to waive minor technical variances or omissions which do not affect the competitive character of the bid.

G. BID SECURITY

All bids must be accompanied by bid security in the amount of five percent (5%) of the bid price in the Contract Documents in the form of either a certified check, an irrevocable letter of credit drawn on a commercial bank and made payable to the DISTRICT, or by a Bidder's Bond accompanied by a Power of Attorney executed by an approved Surety Company authorized to do business in the State of Nebraska and which must appear on the most recently published U.S. Treasury Department Surety List of approved sureties and must act within the limitation listed therein. **Please note that whichever form of bid security is provided, photocopies, or copies transmitted by facsimile will not be**

1. Bidding

If the CONTRACTOR has selected Option 1 or is not licensed to collect sales tax in Nebraska, do not include sales or use tax in your bid price. For bid evaluation purposes, the DISTRICT will evaluate an Option 1 Contractor's bid price by increasing their overall bid by the amount of taxes on building materials.

If the CONTRACTOR has selected Option 2 or Option 3, appropriate sales or use tax should be included in your bid price. For bid evaluation purposes, the DISTRICT will not make any sales tax related adjustments to an Option 2 or 3 Contractor's bid.

2. Invoicing

The CONTRACTOR'S invoices shall clearly and separately reflect, as appropriate, detailed summaries of amounts charged for materials or equipment, labor charges (if applicable), and any other applicable costs as allowed in this Contract. For services performed under this Contract, the CONTRACTOR shall prepare and maintain documentation in sufficient detail to determine and establish which services are subject to sales and/or use taxes, and which services are not subject to sales and/or use taxes, as applicable.

If the CONTRACTOR has selected Yes above and is licensed to collect sales tax in the State of Nebraska, the CONTRACTOR shall state on all invoices the amount of Nebraska sales tax applicable to the items being invoiced. All taxes paid by the DISTRICT pursuant to the CONTRACTOR'S invoices shall be properly remitted by the CONTRACTOR to the State of Nebraska in accordance with applicable laws, rules, and regulations.

If the CONTRACTOR has selected No above, and is not licensed to collect sales tax in the State of Nebraska, the DISTRICT will use the amount stated on the CONTRACTOR'S invoice to determine the amount of Nebraska use tax which will be paid directly to the State of Nebraska by the DISTRICT.

Each invoice shall clearly reference this Contract number and the time period covered. Upon request, the CONTRACTOR shall supply the DISTRICT with complete documentation for all invoiced costs.

C. PRICES

freight prepaid.

All prices for material and/or equipment shall be F.O.B. Gerald Gentleman Station (GGS), ~~freight prepaid.~~

All prices shall be quoted in United States dollars and must not be contingent upon a foreign exchange. Import duties/taxes shall be included in all prices.

at the place and time of installation by CONTRACTOR at

Price Quotation Table

1.	**TOTAL FIRM BASE BID PRICE to design, manufacture, furnish, deliver, ~~and~~ erect/install, commission and startup the Wet Flue Gas Desulfurization Systems (WFGD) as specified in Section G. This price shall include all costs for the CONTRACTOR to provide the specified work scope and all cost associated with fulfillment of all contractual obligations (i.e. bond costs, warranties) specified in the Contract Documents**	[$ _____]

		UNIT 1 - Material	UNIT 1 - Labor	UNIT 2 - Material	UNIT 2 - Labor
2	**FIRM PRICE BREAKDOWN Engineering, Procurement, Fabrication, and Delivery, Storage ~~and~~ Erection/Installation, Commissioning and Startup**	[$ _____] (Sum of Items 2.1 to 2.21)	[$ _____] (Sum of Items 2.1 to 2.21)	[$ _____] (Sum of Items 2.1 to 2.21)	[$ _____] (Sum of Items 2.1 to 2.21)
2.1	Engineering	[$ _____]	[$ _____]	[$ _____]	[$ _____]
2.2	WFGD Equipment Procurement and Fabrication Absorber System	[$ _____] (Sum of Items 2.2.a to 2.2.b)	[$ _____] (Sum of Items 2.2.a to 2.2.b)	[$ _____] (Sum of Items 2.2.a to 2.2.b)	[$ _____] (Sum of Items 2.2.a to 2.2.b)
a.	Absorber System				
a.1.	Absorber Module Shell	[$ _____]	[$ _____]	[$ _____]	[$ _____]
a.2.	Recycle System (including agitators)	[$ _____]	[$ _____]	[$ _____]	[$ _____]
a.3.	Mist Eliminator (ME) Wash System, Tanks, Pumps and Piping	[$ _____]	[$ _____]	[$ _____]	[$ _____]
b.	Ductwork System				
b.1.	Inlet (Wet / Dry) Duct	[$ _____]	[$ _____]	[$ _____]	[$ _____]
b.2.	Outlet Transition Elbow Duct	[$ _____]	[$ _____]	[$ _____]	[$ _____]
b.3.	~~Ductwork, Absorber to Chimney~~Outlet Duct Between Elbow and Chimney	[$ _____]	[$ _____]	[$ _____]	[$ _____]

What is this?

Should we note here that foundations are by others?

Any notes about future CO_2 equipment tie-in?

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Question 1

4.1	Cost ~~adder~~ adjustment to provide a system design with SO2 outlet concentration of ≤ 10 ppm Guaranteed as specified herein for each unit with the flue gas conditions as specified herein without the use of performance enhancing additives such as organic acids. This optional outlet concentration shall be met at all operating loads while firing the full range of fuels, as specified herein, and will be tested per Performance Tests A & B as specified in Section G, Section 441130.~~in accordance with the requirements applicable to the specified guaranteed SO2 Outlet Concentration without the use of performance enhancing adders.~~	[$_____]
4.2	Cost ~~deduct~~ adjustment to remove outlet duct and support structure from scope and provide close-coupled connection between absorber outlet and chimney breeching, including expansion joint.	[$_____]
4.3	Cost adjustment to provide round outlet duct (FRP) to connect with round opening at chimney breeching, in lieu of round to square transition piece with square outlet duct and transition to rectangular breeching. Include expansion joint at chimney breeching and outlet duct expansion joint.	[$_____]
4.4	Cost adjustment to provide round outlet duct (FRP) and transition to rectangular breeching, in lieu of round to square transition piece with square outlet duct and transition to rectangular breeching. Include expansion joint at chimney breeching and outlet duct expansion joint.	[$_____]
4.5	Cost adjustment to provide square outlet duct (metal) and transition to round opening at chimney breeching, in lieu of square outlet duct and transition to rectangular breeching. Include expansion joint at chimney breeching and outlet duct expansion joint.	[$_____]
4.6	Bidder shall provide cost ~~adder~~ adjustment for both absorber vessels to be designed ~~for a negative pressure of additional 30 inches water gauge~~ for operation between -55 in. w.c. / +25 in. w.c. and 40°F to 180°F (400°F max temp for inlet duct) to accommodate CO2 capture equipment installed between WFGD systems and new chimneys.	[$_____]

For future CO_2 capture equipment?

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If at any time any portion of the work is falling behind schedule, the CONTRACTOR shall furnish more workers, work in double shifts, or work overtime to maintain their schedule, all at no additional expense to the DISTRICT.

If at any time during the progress of the work the CONTRACTOR is not behind schedule and is instructed by the DISTRICT to work their forces outside the regular working hours, the CONTRACTOR shall be reimbursed by the DISTRICT only for the following: The actual amounts paid to the workers in excess of the regular straight time rates based on a forty (40) hour work week; e.g., the half-time additional paid if rate of overtime pay is on basis of time and a half; Social Security taxes and contributions imposed upon and required by law to be paid by the CONTRACTOR out of their own funds on account of premium portion of wages paid for performing the work.

NPPD Legal & SCM reviewing these Sections.

T. ADDITIONAL DEFINITIONS

1. "Wet Flue Gas Desulfurization Systems Available" means the Wet Flue Gas Desulfurization Systems is available for DISTRICT's electrical and mechanical contractors to complete the installation of all commodity items such as piping, cable tray and wiring to balance of plant equipment.

2. "Correction Period" shall be as defined in paragraph X.4.d.

3. "Day" means calendar day.

4. "Equivalent Availability Guarantee" is defined in Section G, Section 441130.

5. "Equivalent Availability Guarantee Period" is defined in Section G, Section 441130.

6. "Final Completion" means satisfactory completion by CONTRACTOR of all of the conditions for the Work as set forth in paragraph U.

7. "Final Completion Date" means the date means the dates on which Final Completion for Unit 2 / Common equipment and Unit 1 actually occurs as defined in paragraph W.7.

8. "Final Completion Guaranteed Date" means the date of (INSERT DATE) for Unit 2 / Common equipment and the date of (INSERT DATE) for Unit 1 equipment..

9. "Liquidated Damages Performance Guarantees" means those performance guarantees, the failure of which subject the CONTRACTOR to Liquidated Damages assessments as defined in paragraph X.5.b.

10. "Make Right" means the CONTRACTOR, upon failure of the Performance Tests, shall make all corrections necessary, at CONTRACTOR's cost, to bring the Wet

d Guaranteed FGD Power Consumption

If the actual FGD power consumption is more than the Guaranteed FGD Power Consumption, then CONTRACTOR shall pay to DISTRICT Liquidated Damages Performance Guarantees assessments of $_____ per kilowatt that the actual FGD power consumption is more than the Guaranteed FGD Power Consumption.

e Guaranteed Reagent Preparation / Dewatering Power Consumption

If the actual reagent preparation / dewatering power consumption is more than the Guaranteed Reagent Preparation / Dewatering Power Consumption, then CONTRACTOR shall pay to DISTRICT Liquidated Damages Performance Guarantees assessments of $_____ per kilowatt that the actual reagent preparation / dewatering power consumption is more than the Guaranteed Reagent Preparation / Dewatering Power Consumption.

f Guaranteed Maximum Limestone Consumption

If the actual limestone consumption is more than the Guaranteed Maximum Limestone Consumption, then CONTRACTOR shall pay to DISTRICT Liquidated Damages Performance Guarantees assessments of $_____ per pounds per hour that the actual limestone consumption is more than the Guaranteed Maximum Limestone Consumption.

g Guaranteed ~~Wall-Board~~ Disposal Grade Gypsum Content

If the actual content of the gypsum is below the requirements for Wall-Board Grade Gypsum as defined in Section G, Section 441130, then CONTRACTOR shall pay to DISTRICT Liquidated Damages Performance Guarantees assessments of $_____.

~~h~~ i Guaranteed Equivalent Availability

If the actual equivalent availability is more than the Guaranteed Equivalent Availability, then CONTRACTOR shall pay to DISTRICT Liquidated Damages Performance Guarantees assessments of $_____ per percent that the actual equivalent availability is more than the Guaranteed Equivalent Availability.

6. Maximum Liability for Liquidated Damages Performance Guarantees

CONTRACTOR's maximum liability for Liquidated Damages Performance Guarantees assessments under paragraph X.5 above shall not exceed twenty percent (20%) of the Contract Price.

h Guaranteed maximum Liquid Waste Stream Blowdown (GPM)

All invoices shall be sent to:

Nebraska Public Power District
Attention: Accounts Payable
P.O. Box 1740
Columbus, Nebraska 68602-1740 accountspayable@nppd.com

The CONTRACTOR'S Federal Taxpayer Identification Number and the DISTRICT'S ten (10) digit Purchase Order Number shall be shown on all invoices. In addition, for sales tax purposes, all invoices shall clearly and separately reflect changes as required in Section C, Paragraph B, "Sales and Use Taxes".

C. CHANGES (CHANGE WORK)

1. The DISTRICT may order changes in the work consisting of additions, deletions, or other revisions which may or may not involve a change in cost. "Change Work" is defined as work not included in the original Contract work.

2. Whenever the DISTRICT shall order any such change, the DISTRICT will send to the CONTRACTOR a written change order specifying the change in work.

3. If at any time the CONTRACTOR receives any change order, drawing, specification, instruction or request from the DISTRICT, which the DISTRICT considers no-cost Change Work but which in the CONTRACTOR'S opinion requires the payment of additional compensation, they shall within fifteen (15) calendar days after such receipt notify the DISTRICT that they consider the change requires additional compensation.

4. The DISTRICT and the CONTRACTOR shall negotiate an agreement for compensation to be paid for such Change Work. When there is Change Work which involves some change in cost, compensation for such additional work or modified work resulting from such change, as well as credits for deletions or revisions, shall be determined by the unit prices as set forth in the Contract Documents. If no applicable unit prices have been so set forth but unit price is an appropriate method of revising cost, the parties shall mutually agree upon unit prices. If no unit prices have been so set forth or the parties are unable to agree on appropriate unit prices, either of the following methods, or a combination thereof shall be used to determine the revision in cost.

   a. An agreed lump sum amount.

   b. Cost plus a fixed fee to cover overhead and profit, which total shall include only the following:

      (1) For work to be performed by CONTRACTOR:

the provisions for reimbursement of such taxes found in the Proposal ~~on page C-2~~in Section C, paragraph B.

5. If in any of the situations outlined above the CONTRACTOR and the DISTRICT fail to agree upon compensation to be paid for Change Work or the DISTRICT rejects the CONTRACTOR'S written claim for additional compensation, the CONTRACTOR shall nevertheless promptly proceed with Change Work requested as specified, and the parties shall attempt to reach agreement at a later time.

In this instance the CONTRACTOR shall maintain accurate records of the cost of Change Work, including daily direct labor time records approved and signed by the DISTRICT, or its authorized representatives, and also records of its other costs.

6. a. The CONTRACTOR agrees to perform the Change Work requested by the DISTRICT and not to claim additional compensation for delay resulting from the Change Orders and not to claim damages arising out of the giving of them, the amount of time, or the items when ordered, their full compensation for them being the payments provided according to paragraph C.4., above. Extensions of time for Change Work will be governed by provisions found in paragraph L.3., "Time for Completion".

D. EMPLOYMENT AND LABOR RELATIONS

All work to be done under this Contract shall be subject to the following regulations:

1. Qualifications for Employment

The CONTRACTOR shall abide by all lawful rules and regulations governing employment of persons on the work as covered by these Specifications and in execution of this Contract shall maintain fair labor standards. Workers who are citizens of the State of Nebraska shall be employed by this CONTRACTOR whenever possible.

2. Equal Opportunity

The following clause is applicable unless this Contract is exempt under the rules and regulations of the Secretary of Labor (41 C.F.R., Chapter 60, and any amendments thereto).

During the performance of this Contract, the CONTRACTOR agrees as follows:

a. The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, creed, color, religion, sex, or national origin. The CONTRACTOR will take affirmative action to ensure

the DISTRICT, exchange of information and other means suggested by the DISTRICT.

The CONTRACTOR shall, promptly and without detriment to the work, dismiss for cause, any superintendent, foreman, or any other employee of the CONTRACTOR or their Subcontractor, for reasons including but not limited to the following:

a. Intoxication, use of drugs, fighting, stealing or willful destruction of property; or

b. Reporting to the site with contraband such as: drugs, firearms, explosives, any concealed weapons, or alcoholic beverages.

Any person discharged for cause by the CONTRACTOR or Subcontractor may not be re-employed on the jobsite, without the DISTRICT'S approval.

E. ACCIDENT PREVENTION

Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of all applicable laws and building and construction codes shall be observed. Machinery, equipment and other hazards shall be guarded in accordance with the regulations promulgated under the Occupational Safety and Health Act Public Law 91-596 (OSHA), plus state and local statutes.

F. LAWS AND REGULATIONS

Replace with Laws and Regulations on following 2 copied pages.

Laws, Ordinances and Regulations

In the execution of the work under this Contract, the CONTRACTOR and their Subcontractors shall comply with all prevailing and applicable laws and ordinances. The CONTRACTOR shall protect the DISTRICT from all fines and penalties (except "consequential damages" as specified in paragraph Q) arising from violation of laws and ordinances of any kind by either themselves or their Subcontractor in effect on the date of this Contract.

The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the CONTRACTOR observes that the drawings and specifications are at variance therewith, they shall promptly notify the DISTRICT in writing and, any necessary changes shall be adjusted as provided in paragraph C.3, herein.

G. AUDIT AND INSPECTION

If work hereunder is being performed on a time and expense basis, or in the event that the work is being performed on a fixed price basis and any portion of the work is

a. Intoxication, use of drugs, fighting, stealing or willful destruction of property; or

b. Reporting to the site with contraband such as: drugs, firearms, explosives, any concealed weapons, or alcoholic beverages.

Any person discharged for cause by the CONTRACTOR or Subcontractor may not be re-employed on the jobsite, without the DISTRICT'S approval.

E. ACCIDENT PREVENTION

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F. LAWS AND REGULATIONS

1. Laws, Ordinances and Regulations

In the execution of the work under this Contract, the CONTRACTOR and their Subcontractors shall comply with all prevailing and applicable laws and ordinances. The CONTRACTOR shall protect the DISTRICT from all fines and penalties (except "consequential damages" as specified in paragraph Q) arising from violation of laws and ordinances of any kind by either themselves or their Subcontractor in effect on the date of this Contract.

The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the CONTRACTOR observes that the drawings and specifications are at variance therewith, they shall promptly notify the DISTRICT in writing and, any necessary changes shall be adjusted as provided in paragraph C.3, herein.

New Paragraph

2. Verification of Worker's Lawful Status to Perform Work

The CONTRACTOR shall use a federal immigration verification system to determine the work eligibility status of any newly hired permanent or temporary employees, physically performing services within the State of Nebraska, under this Contract. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security, or other federal agency authorized to verify the work eligibility status of a newly hired employee.

New Paragraph Continued

If the CONTRACTOR is an individual or sole proprietorship, and does not have employees, prior to commencing work under this Contract, the CONTRACTOR shall complete the following items:

a. The CONTRACTOR must complete the United States Citizenship Attestation Form, available on the Department of Administrative Services website at www.das.state.ne.us.

b. If the CONTRACTOR indicates on such attestation form that he or she is a qualified alien, the CONTRACTOR agrees to provide to the DISTRICT, the United States Citizenship and Immigration Services documentation required to verify the CONTRACTOR'S lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.

c. The CONTRACTOR understands and agrees that lawful presence in the United States is required, and the CONTRACTOR may be disqualified or the Contract terminated if such lawful presence cannot be verified as required by Neb. Rev. Stat. §4-108.

This verification requirement also applies to any subcontractor hired by the CONTRACTOR to assist in the performance of the work under the terms and conditions of this Contract. The CONTRACTOR is responsible to ensure that each subcontractor complies fully with the requirements contained in this section.

G. AUDIT AND INSPECTION

If work hereunder is being performed on a time and expense basis, or in the event that the work is being performed on a fixed price basis and any portion of the work is subsequently performed on a time and expense basis through an Amendment to this Contract, the CONTRACTOR shall keep accurate records and books of accounts showing all charges and expenses incurred in the performance of such work. The DISTRICT shall have the right upon reasonable notice to verify at any time, up to two (2) years after satisfactory completion of the work and/or services, all costs, expenses, and disbursements made or incurred by the CONTRACTOR in connection with the work to be performed on a time and expense basis hereunder and may examine the CONTRACTOR'S books and records relating thereto.

If work hereunder includes materials and or equipment, the DISTRICT reserves the right to perform such examination, inspection and tests of equipment, material and workmanship as it may desire to assure itself that the work meets all specified requirements. The CONTRACTOR shall furnish all information requested by the DISTRICT concerning the nature, quantity, or source of any materials or equipment.

Authorized inspectors for the DISTRICT shall have authority to reject materials and workmanship which are defective or not in accordance with this Contract, and to require

Nebraska Public Power District

Covered in Section 011100-9 Paragraph 109

~~If technical direction is required during the execution of the work under this Contract, the following paragraphs shall apply.~~

~~Technical Direction of Installation, Field and Start Up Testing is defined as technical direction and services supplied by the CONTRACTOR in connection with the erection, field and start up testing of equipment supplied by the CONTRACTOR under this Contract. These services are subject to the DISTRICT'S approval.~~

~~The CONTRACTOR shall provide the services of qualified personnel to give technical advice regarding methods and procedures for the unloading, handling, storage and installation of the equipment covered by this Contract; to direct the DISTRICT'S representatives in making operating tests; and to instruct the DISTRICT'S operating personnel in the recommended procedures for starting, operating, and shutting down the equipment.~~

~~The qualified personnel shall also perform the following services:~~

~~1.Inspect the major parts as to assembly, clearances, alignment, and cleanliness.~~

~~2.Observe work practices and procedures of installation personnel to assure that factory-recommended installation procedures are not violated.~~

~~3.See that the necessary prints and instructions are provided to accomplish planned installation.~~

~~The CONTRACTOR shall furnish special erecting tools and instruments if required.~~

~~The CONTRACTOR shall warrant that the technical direction for the installation shall be competent. If any equipment or structures shall prove to have been damaged as a direct result of defective technical direction within the year after the initial date of commercial operation, the CONTRACTOR shall repair or replace the parts directly affected by such defective technical direction at the CONTRACTOR'S expense.~~For requirements on technical direction, field services and training, refer to Section G.

F. SCHEDULE AND PROGRESS REPORTS

In addition to any other requirements in this Contract Document, the CONTRACTOR shall furnish to the DISTRICT, thirty (30) days after notification of award of the contract, a Critical Path Method (CPM) schedule of expected progress for the work to be performed under this contract, conforming in all respects to the requirements of Section D, paragraph L, subparagraph 1 of this Contract Document.

Any data required by the CONTRACTOR from other contractors, or the DISTRICT, shall be indicated merely by an arrowhead activity. CONTRACTOR'S assumed times for these activities will be subject to approval of the DISTRICT. Such schedules as are

All portions of the contracted field work shall be done by personnel who are experienced and skilled in the type of work assigned to them. All work shall be accomplished by currently accepted methods, using CONTRACTOR supplied labor, supervision, equipment, tools, devices, materials, and things of the kind and type necessary to do all phases of the work in a proper and expedient manner as specified by the DISTRICT in these Contract Documents.

All types and kinds of field work shall be done under the direction of one competent superintendent stationed at the job site whenever the work is in progress, and fully authorized by the CONTRACTOR to represent, act, and negotiate for them in their absence.

The superintendent shall not be changed except with the consent of the Project Engineer, unless the superintendent proves to be unsatisfactory to the CONTRACTOR and ceases to be in their employ. The superintendent shall be fully authorized to represent and to act and negotiate for the CONTRACTOR in their absence, and all directions given to them shall be as binding as if given to the CONTRACTOR. Directions shall be confirmed in writing to the CONTRACTOR. The CONTRACTOR or their field superintendent shall give efficient supervision to all phases of work, using their best skill and attention.

A Daily Construction Report is to be prepared by the CONTRACTOR and each of their Subcontractors. The CONTRACTOR is to deliver these reports to the DISTRICT before 10 a.m., of the following work day. This report will include top supervision by name and title, number of foremen, the exact number of men of each craft, the hours worked on the jobsite, mandays lost if any, cause of lost time, i.e., inclement weather or labor problems.

A Weekly Construction Report is to be prepared by the CONTRACTOR and each of their Subcontractors. This report will be due in the DISTRICT'S office by noon, Monday of the following week. This report will include a manpower summary by craft and a brief description of work completed for the past week. The report will also include a brief description of expected work accomplishment for the current week.

H. CONTRACTOR EMPLOYEE IDENTIFICATION

Each of the CONTRACTOR'S employees shall be identified by hard hat number provided by the CONTRACTOR.

I. PARKING AT JOBSITE

Parking of the CONTRACTOR'S and employees' cars, except as required for the performance of work, will be in an area as designated by the DISTRICT. Parking of vehicles along roads, access areas or drives will not be tolerated and the CONTRACTOR shall control their employees' parking upon request by the DISTRICT.

J. SECURITY GATE ACCESS

New Section
See copied 2
pages

Nebraska Public Power District

The superintendent shall not be changed except with the consent of the Project Engineer, unless the superintendent proves to be unsatisfactory to the CONTRACTOR and ceases to be in their employ. The superintendent shall be fully authorized to represent and to act and negotiate for the CONTRACTOR in their absence, and all directions given to them shall be as binding as if given to the CONTRACTOR. Directions shall be confirmed in writing to the CONTRACTOR. The CONTRACTOR or their field superintendent shall give efficient supervision to all phases of work, using their best skill and attention.

A Daily Construction Report is to be prepared by the CONTRACTOR and each of their Subcontractors. The CONTRACTOR is to deliver these reports to the DISTRICT before 10 a.m., of the following work day. This report will include top supervision by name and title, number of foremen, the exact number of men of each craft, the hours worked on the jobsite, mandays lost if any, cause of lost time, i.e., inclement weather or labor problems.

A Weekly Construction Report is to be prepared by the CONTRACTOR and each of their Subcontractors. This report will be due in the DISTRICT'S office by noon, Monday of the following week. This report will include a manpower summary by craft and a brief description of work completed for the past week. The report will also include a brief description of expected work accomplishment for the current week.

L. PARKING AT JOBSITE

Parking of the CONTRACTOR'S and employees' cars, except as required for the performance of work, will be in an area as designated by the DISTRICT. Parking of vehicles along roads, access areas or drives will not be tolerated and the CONTRACTOR shall control their employees' parking upon request by the DISTRICT.

M. SECURITY GATE ACCESS

1. All CONTRACTOR personnel and vehicular traffic shall enter and leave the GGS site through the DISTRICT-designated security entrance gate. Unauthorized personnel will not be permitted on site. A photo ID is required of all personnel prior to entrance on site.

New Langage

2. Upon initial arrival at GGS, CONTRACTOR employee(s) shall be expected to complete the following:

   a. Employees shall first stop and register at the District-designated site access gate. At this time, security personnel shall issue the CONTRACTOR employee(s) a visitor pass, an index card that details their ID badge information, and a temporary vehicle pass (T-Pass) if driving a company vehicle on site.

   b. CONTRACTOR employees shall then be escorted to the Employee Development Center or directed to a destination indicated by a DISTRICT

representative to receive General Orientation Training (GOT) and have their picture taken for creating a photo ID badge. Upon completion of the GOT and picture taking, the CONTRACTOR employee(s) shall immediately report to their supervisor or DISTRICT representative.

c. A photo ID badge of the employee(s) shall be prepared and delivered to the appropriate entry/exit gate. The photo ID badge will then be available to the individual(s) upon their next and all subsequent entries to site.

d. The CONTRACTOR employee(s) shall retain their ID badge on them at all times while they are on site. If conditions mandate, all CONTRACTOR employee(s) may be asked to prove their identity and approval of site access by displaying their ID badge to DISTRICT personnel.

e. If a CONTRACTOR employee(s) has been issued a vehicle T-Pass, they shall clearly display this pass so it is visible through the front windshield of the vehicle. This requirement for a vehicle T-Pass extends to all CONTRACTOR vehicles that are brought on site.

3. Once the CONTRACTOR employee(s) have received their photo ID badge, the following steps shall be followed when entering and leaving the GGS site:

a. When entering or leaving the site through either south access Gate 30A, or Gate 16, each individual entering or leaving on foot shall be required to enter and exit through a turnstile. In the case of personnel riding in vehicles that are entering through either of these gates, or leaving through Gate 30A, all individuals, including the driver, shall first provide their ID Badge to security personnel. Security personnel will scan each ID badge past the card reader. Once all badges have been read security personnel will allow the vehicle to be driven through the gate.

b. When entering or leaving the GGS site through the west main access gate, individual employees shall be required to enter and egress through either a turnstile at Gate 38, if on foot, or if in a vehicle through the main gate. In the case of personnel riding in vehicles that are entering or leaving through this gate, the photo ID badge of all individuals, including the driver, shall be scanned. Afterward, the vehicle will be allowed to pass through the gate.

c. If the CONTRACTOR employee(s) enter and exit through a turnstile (i.e., either at one of the south gates or the west main access gate), they shall do so one at a time. The CONTRACTOR employee(s) shall ensure that the turnstile "locks" each time a person goes through the turnstile. "Piggy backing" through the turnstile or not ensuring the turnstile has locked after each individual goes through is prohibited.

1. All CONTRACTOR personnel and vehicular traffic shall enter and leave the GGS plant site through the DISTRICT designated security entrance gate. Unauthorized personnel will not be permitted on the site.

2. Upon initial arrival at GGS, the CONTRACTOR'S employee(s) shall be expected to complete the following:

   a. Employees shall first stop in and register at the main plant Guard House. At this time, Security personnel shall issue the CONTRACTOR employee(s) a visitor pass, an index card that details their ID badge information, and a temporary vehicle pass (T-Pass) if driving a company vehicle on the facility. Please note that a photo ID will be required for initial registration.

   b. CONTRACTOR employees shall then be directed to immediately proceed to the Employee Development Center or a destination indicated by a DISTRICT representative to receive General Orientation Training (GOT).

   c. Upon completion of their GOT, a photo ID of the employee(s) shall be prepared and issued to the individual CONTRACTOR employees. Following the receipt of their photo ID badge, the CONTRACTOR employee(s) shall immediately report to their supervisor or District representative.

   d. The CONTRACTOR employee(s) shall retain their ID badge on them at all times while they are on-site at GGS. If conditions mandate, all CONTRACTOR employee(s) may be asked to prove their identity and approval of site access by displaying their ID badge to District personnel.

   e. If a CONTRACTOR employee(s) has been issued a vehicle T-Pass, they shall clearly display this pass so it is visible through the front windshield of the vehicle. The requirement for a vehicle T-pass extends to all CONTRACTOR vehicles that are brought on the GGS plant site.

3. Once the CONTRACTOR employee(s) has / have received their photo ID, the following steps shall be followed when entering and leaving the GGS work site:

   a. When entering or leaving the GGS work site through the south access gate, each individual employee shall be required to enter and egress through the turnstile. In the case of company personnel riding in vehicles that are coming or leaving through this gate, all individuals, including the driver, shall first go through the turnstile. Once everyone has passed through the turnstile, Security personnel will open the gate to allow the driver to bring the vehicle through the gate.

b. When entering or leaving the GGS work site through the west main access gate, individual employees shall be required to enter and egress through either the turnstile or via a vehicle through the main gate. In the case of company personnel riding in vehicles that are coming or leaving through this gate, all individuals, including the driver, shall scan their ID badge in front of the grey security scanner located at the gate.

c. If the CONTRACTOR employee(s) enter and egress through a turnstile (i.e., either at the south gate or the west main access gate), they shall do so one at a time. The CONTRACTOR employee(s) shall ensure that the turnstile "locks" each time a person goes through the turnstile. "Piggy backing" through the turnstile or not ensuring the turnstile has locked after each individual goes through is prohibited.

d. The CONTRACTOR shall determine on their own whether they want to hold all their employee District-issued identification badges once they leave site for the shift, or whether they want the individual employees to retain them.

e. The CONTRACTOR shall immediately notify Security personnel if an ID badge has been lost or stolen. At that time, a new ID badge will be issued.

f. In regard to monitoring employee and contractor activities while on-site at GGS, please note that the entire GGS site is under constant camera surveillance. This area includes the south and main gate access turnstiles and vehicle gates.

4. When a CONTRACTOR employee(s) is to leave the site for more than twenty-four (24) hours at a time, the following steps shall be followed:

a. The CONTRACTOR employee(s) shall return the ID badge and vehicle T-Pass, as applicable, to the GGS main plant Guard House on the last day of work at the end of their work shift.

b. The CONTRACTOR employee(s) shall clearly inform the Security personnel at the GGS main plant Guard House that they are leaving the site for more than a twenty-four (24) hour period. CONTRACTOR employee(s) gate access will then be revoked.

c. If / When a CONTRACTOR employee(s) returns to the GGS plant site, their photo ID will be reissued and their gate access shall be restored. If their return date is within the calendar year, the CONTRACTOR employee(s) will not be required to attend GOT training. If the CONTRACTOR employee's return date is in a succeeding year, the CONTRACTOR employee(s) shall be required to attend GOT training.

5. In addition to these requirements, the CONTRACTOR shall perform the following steps on a daily basis:

   a. Complete the requested information on the District-issued "Daily Contractor Report". This report shall clearly identify any CONTRACTOR personnel who shall be leaving the work site for more than twenty-four (24) hours at a time. The properly completed "Daily Contractor Report" shall be returned to the CONTRACTOR'S District site contact by 10:00 a.m. of the following calendar day.

6. Materials or equipment leaving the GGS plant site shall be authorized by the DISTRICT. The DISTRICT, at its option, may check the ingress and egress of CONTRACTOR personnel and traffic. If necessary, when leaving the plant site, the DISTRICT and GGS Security personnel reserve the right to perform random searches of CONTRACTOR'S vehicles, tool boxes, etc. that are brought on-site to search for illegal materials or stolen property.

This paragraph stays.

K. CONTROL OF PERSONNEL

The CONTRACTOR shall at all times be responsible to the DISTRICT for all acts of and happenings to their employees. They shall also be held responsible for all acts of and happenings to employees of any Subcontractors that may be doing work on this project for them.

Immediately upon arrival on-site the CONTRACTOR must provide the station telephone operator with a written summary of their personnel and their Subcontractor personnel who will be performing work on-site. After submittal of the initial summary, and throughout the duration of on-site work, the CONTRACTOR must submit a written weekly summary for the next week to the station telephone operator no later than 3 p.m. every Friday. Each summary must include the CONTRACTOR'S company name, the name and position of the CONTRACTOR'S on-site employee who is responsible for the CONTRACTOR'S on-site personnel, the on-site telephone number of the CONTRACTOR, the CONTRACTOR'S on-site DISTRICT contact person, the name of each employee working on-site, and the specific days and times that the employee will be on-site.

L. INTERFERENCE WITH OPERATIONS OF PLANT

The DISTRICT is engaged in the business of generating, transmitting, and distributing electric power and energy. Neither the CONTRACTOR nor any of their Subcontractors nor any employee of either of them shall enter any part of the DISTRICT'S premises other than the construction area as established by the DISTRICT, or touch, move, manipulate or tamper with any of the DISTRICT wires, pipes, fixtures, machines, appliances or equipment without express permission from the DISTRICT.

CD-R, Electronic Mail or another DISTRICT approved media. Lineweights and/or polylines are to be used to assign object thickness. The DISTRICT has the right to reject CADD files for incompatible AutoCAD versions or inaccurate conversions to AutoCAD.

3. Media Shipping

a. If hardcopy is required, each final drawing shall be rolled, not folded, and packaged in such a way that the drawing edges are protected from damage, and enclosed in a mailing tube or other DISTRICT approved packaging when submitted to the DISTRICT.

b. This media shall be submitted to:

DRAWING AND DATA	MANUALS
Nebraska Public Power District Attn: Bob Nitsch (NPPD to advise) P. O. Box ~~499~~ 68 ~~1414 15th Street~~ 6089 S Hwy 25 ~~Columbus~~, Nebraska ~~68601-5226~~ Sutherland 69165-6089	Nebraska Public Power District Attn: Bob Nitsch (NPPD to advise) P. O. Box ~~499~~ 68 ~~1414 15th Street~~ 6089 S Hwy 25 ~~Columbus~~, Nebraska 68601-5226 Sutherland 69165-6089

4. Instruction/Operation Manuals

a. The CONTRACTOR shall submit one (1) electronic copy of the preliminary Instruction Manuals to the DISTRICT for review. The electronic copy shall be submitted in accordance with the project distribution list and the file format noted in Item E.4c.

~~a.~~b. The CONTRACTOR shall submit _____ (~~)~~eight (8) hard copies of the final Instruction Manuals to the DISTRICT, as well as one (1) electronic copy per the . The manuals shall be assembled and bound in book form with a durable cover, and with reasonable care, shall have a life expectancy equal to the service life of the equipment purchased. Instruction Manuals shall be submitted to the address provided in specification Item E.3b.

c. The electronic copy of the Instruction Manual shall be in pdf format, and match the information contained in the hard copies. The pdf file shall contain bookmarks, be searchable and be unlocked to allow for future editing by the DISTRICT as required.

~~b.~~d. The DISTRICT has the right to reject at any time the submitted Instruction Manual(s) if considered unsuitable for microfilming, due to poor quality or poor legibility. The Supplier shall provide an acceptable replacement(s) at no additional cost to the DISTRICT.

ELECTRICAL EQUIPMENT

Cable Terminations and Accessories

3M
Raychem

Motor Control Centers, Starters and Contactors

Allen Bradley
Eaton
General Electric
Siemens
Square D

300V Instrument Cable & 600 V Control Cable

Anixter
Belden
Houston Wire and Cable
Kerite
Okonite
Pirelli
Rome Tamaqua
General Cable

600V and Medium Voltage Power Cable

Anixter
Belden
BICC/Cablec
Houston Wire and Cable
Kerite
Okonite
Pirelli
Rome Tamaqua
General Cable

Distribution, Transformers and Power Panels

ABB
Eaton
GE

Building Area Lighting

Hubbell
General Electric
Holophane Lighting
Crouse-Hinds
Sylvania
Phillips

Motors – Low Voltage

General Electric
Siemens
TECO/Westinghouse
Reliance Electric
Toshiba
WEG
Marathon Electric

Motors – Medium Voltage

General Electric
Siemens
TECO/Westinghouse
Toshiba
WEG
EM (Electric Machinery)

Variable Frequency Drives – Low Voltage

Allen Bradley

Auxiliary Relays

Allen-Bradley
Square D
Eaton

Solenoid Valves

ASCO

Valve Motor Operators

Limitorque
AUMA
Rotork

Note – We prefer Limitorque only

NPPDRH114_0003360
ED_005798_00000482-00020

SECTION 013119

PROJECT MEETINGS

I DON'T THINK THIS INFOR GOES HERE, How about in Section F

Don - This stuff was in Section G for Cont 7-46; he could go either way.

101. GENERAL

101.1 CONTRACTOR shall:

a. Schedule and administer pre-construction and progress meetings.

b. Prepare meeting agendas.

c. Provide written notice and distribute agendas 4 days in advance of ~~meeting date~~.

d. Make physical arrangements for meetings.

e. Preside at meetings.

f. Record minutes, including significant proceedings and decisions. These shall be recorded and copies of minutes distributed to participants within 4 days after meetings.

g. Refer to Section 013330 for information on 3-D model review meetings.

101.2 CONTRACTOR and subcontractors will be required to attend a progress meeting when called by DISTRICT to discuss work progress, coordinating, expediting, scheduling, any problems, etc.

102. PRE-CONSTRUCTION MEETING

102.1 CONTRACTOR shall schedule a pre-construction meeting prior to the start of Work.

102.2 Meeting shall be attended by the DISTRICT, Consulting Engineer, CONTRACTOR, major subcontractors, and safety representative. The purpose of this meeting will be to finalize the Project Schedule and discuss any outstanding questions regarding scope of work or other specification requirements.

102.3 CONTRACTOR shall submit two copies of the proposed detailed work schedule to DISTRICT and the Consulting Engineer for review 1 week prior to the scheduled preconstruction meeting.

103. PROGRESS MEETINGS

103.1 CONTRACTOR shall schedule weekly progress meetings and/or hold call meetings as progress of work dictates, but not fewer than 2 progress meetings per month.

103.2 CONTRACTOR shall attend daily progress meetings (if required as determined by DISTRICT) with DISTRICT and the sub contractors.

103.3 Meetings shall be attended by the CONTRACTOR, major subcontractors, DISTRICT's Representative, Consulting Engineer and safety representative.

END OF SECTION 013119

d. Platforms shall be provided where equipment checks or lubrication are required.

e. Equipment arrangements, pipe routings and cable tray locations shall be designed by the CONTRACTOR for maximum equipment accessibility and to allow the following types of access:

e1. Space shall be provided to allow plant personnel easy access to all equipment, which may require maintenance.

e2. Space shall be provided to allow unobstructed access for maintenance tools and equipment required for maintenance on permanently installed equipment.

e3. Space shall be provided to motor-operated equipment areas for work carts.

e4. Ample space shall be provided to allow removal and laydown of any equipment that cannot be maintained in place or may require replacement.

f. Lifting eyes shall be provided by the CONTRACTOR on equipment to facilitate installation and removal for maintenance.

g. Beams and trolleys shall be provided by the CONTRACTOR where necessary for maintenance, including removal, of all major pieces of equipment. Portable lifting equipment may be provided only as approved in writing by DISTRICT in some cases to serve multiple plant equipment. All beams, trolleys and lifting equipment shall be marked with capacity ratings per OSHA requirements. All cranes, hoists and trolleys shall be designed in accordance with Section 412200.

h. Techniques for minimizing corrosion of structures and equipment exposed to chemically or environmentally corrosive atmospheres shall be incorporated into the equipment design by the CONTRACTOR. Removable panels with lifting eyes on enclosures shall be provided by the CONTRACTOR where required.

i. Special attention shall be given by the CONTRACTOR to providing appropriate enclosures, curbs, drip guards and collection systems for fugitive water, hose spray water, chemicals and oils.

j. Where feasible, similar equipment shall be provided by the CONTRACTOR by the same supplier to minimize spare parts inventories and to minimize the number of different suppliers' equipment that plant personnel must be capable of maintaining.

k. Transmitters, isolation valves, bypass valves, vents, and low point drains shall be located and oriented by the CONTRACTOR to allow access and maintenance by maintenance personnel from permanent walkways or platforms.

l. Adequate provisions shall be included by the CONTRACTOR for compressed air, service water, general purpose electrical outlets and welding receptacles to support maintenance activities as follows:

l1. Minimum of ¾" ~~Two inch (2")~~ compressed air ~~supply lines~~ hose stations with Chicago style quick disconnect couplings and isolation valves shall be provided by the CONTRACTOR at each level of building or structures. Spacing of the compressed air ~~supplies~~ hose stations shall be sufficient to ensure overlapping coverage with 50 foot hoses.

l2. Washdown water ~~connection~~ hose stations shall be provided by the CONTRACTOR at 150 foot intervals. Each ~~connection~~ hose station shall be a minimum of ¾" and provided with a globe valve and a Chicago style quick coupling. At each station, one 100 foot hose with nozzle shall be provided.

Numbering is messed up

l. CONTRACTOR shall provide a minimum of two welding receptacles per elevation. ~~[Verify]~~

m. Equipment and systems shall be provided by the CONTRACTOR with isolation capability for personnel safety during maintenance activities. Design shall facilitate lock out, tag out, double block and bleed, etc. to satisfy requirements of OSHA 19 10.269 and 147.

n. The CONTRACTOR shall show Equipment removal paths on the design drawings and these paths shall be maintained clear of obstructions and interferences.

o. Provisions shall be made by the CONTRACTOR for easy access and removal of rotating elements, including gearboxes, bearings, etc. for all major equipment.

p. Access doors shall be provided by the CONTRACTOR in buildings to accommodate maintenance of major plant equipment.

END OF SECTION 018100

Numbering is messed up

Can this figure be made darker?

FIGURE 1

c. Each belt shall be a continuous reinforced belt with no joints or splices which place any stitching or bonding in tension.

d. The finished product shall be cured or bonded together using a flat bed press. Hand lay-up [bag curing] or "rotocure" is not acceptable. The outermost ply of the expansion joint shall be clearly marked with its identification numbers using a weatherproof marking system.

204.4 Acceptable manufacturers include the following:

a. Bachmann Industries, Inc.

b. Pathway, Inc.

c. Papco Industries

d. Senior Flexonics

e. Frenzelit North America, Inc.

f. Others as accepted by the DISTRICT

204.5 Fabrication:

a. Expansion joint fabrication shall conform to the requirements specified by the manufacturer, indicated on the expansion joint manufacturer Drawings and specified herein.

f. Filament Wound Fiberglass Reinforced Plastic (FRP) pipe to include 100 mil liner. Joints to be bell and spigot for structural adhesive bonding, plain end for butt and wrap welding, and/or socket flanges for structural adhesive bonding. (NOTE ARE THERE ANY SPECIFIC "CODES AND STDS" FOR FRP ?

g. All austenitic stainless steel materials shall be in a solution-annealed condition, which shall consist of heating to 1900°F or higher and holding for an appropriate time. Subsequent cooling shall be from the annealing temperature to below 800°F to prevent carbine precipitation in the grain boundaries. Austenitic stainless steel shall not be used if subjected to a post-weld heat treatment in the range of 800°F to 1800°F, regardless of subsequent cooling rate.

PART 3 – EXECUTION

301. FABRICATION AND INSTALLATION

301.1 Shop Fabrication

a. Fabrication of piping shall be performed in an off-site permanently established shop with all facilities for pipe fabrication, welding, certification, testing, cleaning and painting. The fabrication shop or SUBCONTRACTOR shall be experienced in piping fabrication.

b. Piping shall be fabricated by CONTRACTOR to the maximum extent possible as constrained by shipping size limits.

c. All piping shall be fabricated and welded in the shop as far as possible to reduce the number of field joints to a minimum.

d. Piping fabrication and testing procedures shall be made available for DISTRICT's reference and/or review.

e. Field welds shall be located so that they are readily accessible for welding and (when required) for stress relieving.

f. The length of shop-welded sections shall be determined by shipping limitations, maneuverability and erection space available, subject to review and acceptance by the DISTRICT.

g. CONTRACTOR shall meet "C" dimensions on all ends to be field welded.

h. The ends of all weld connections on shop-fabricated sections shall be properly machined in accordance with the welded joint specified.

i. All flange attachments shall be rechecked after welding to ensure proper alignment.

j. Each shop-fabricated section of piping shall have all nozzles, weld end fittings and all couplings and nipples for drains or for instrument connections welded on in the shop, as far as possible.

k. Thermowells shall be installed with the axis of the thermowells at right angles to the pipeline or duct wall for all ducts and for all pipelines larger than 4 inches. For pipelines 4 inches and smaller, pipe portion to be expanded with a tee and thermowells shall be installed the tee section.

301.2 General Fabrication

~~h.~~i. The equipment shall be of such a design so as not to allow oil or other materials, which may cause a fire, explosion or coking hazard, to enter the compressed air system.

~~i.~~j. Rotor axial thrust shall be counterbalanced to prevent overloading of gear unit and thrust bearing.

~~j.~~k. All anchors, bracing and supports (rigid and spring type) required to support piping that is integral with the equipment shall be furnished by CONTRACTOR.

~~k.~~l. Oil cooler, and inter and aftercooler(s) (if furnished) shall have ample capacity to cool oil or the air to the acceptable material temperature limit of the downstream equipment and piping, when in a 85 percent fouled condition.

~~l.~~m. All condensate pockets in compressors and coolers shall be drainable. CONTRACTOR shall furnish and mount traps, bypass valves and interconnecting piping as required for drains. Traps and valves shall be readily accessible for inspection, maintenance, and operation.

~~m.~~n. All water passages in the heat exchangers and compressor shall be provided with air vents, drains, and shutoff valves, arranged to be accessible for operating and maintenance.

102.2 Required Operating Characteristics:

a. The Compressor components shall be designed for the maximum pressure and temperature that will exist within.

b. Duplicate compressors shall operate singly or in parallel, satisfactorily.

c. The time required to start the compressor and bring it to full operation shall be no more than 10 seconds.

102.3 CONTRACTOR shall provide cooling water from available water sources. If the available water sources do not meet the cleanliness requirements of the compressors, then the CONTRACTOR shall provide either air cooled compressor units, or a separate closed loop cooling system for the compressors. The closed loop cooling system shall be totally self-contained, with the closed cooling water meeting the cleanliness requirements of the compressor cooling system. The closed loop system shall be supplied with its own pumping station and coolers which will use an available water source for cooling.

102.4 Equipment Sound Levels:

a. The warranted maximum A-weighted sound level shall not exceed 85 DBA (dB, Re: 0.0002 microbar) at any point three (3) feet ~~one meter~~ from the compressor-motor assembly under any operating conditions measured in accordance with ANSI S.1.9. If 85 dBA is not achievable without noise abatement features, CONTRACTOR to provide an alternative guarantee including noise abatement features such as acoustical insulation blanketing and/or acoustical enclosures as required. Sound levels over 95 dBA are not acceptable.

103. REFERENCE DOCUMENTS

103.1 Standards, specifications, manuals, codes and other publications of nationally recognized organizations and associations are referenced herein. Methods, equipment and materials specified herein shall comply with the specified and applicable portions of the referenced documents, in addition to federal, state or local codes having jurisdiction. References to these documents are to the latest issue date of

c. Electric Heaters (if required):

c1. CONTRACTOR will be responsible for furnishing and incorporating in the design and fabrication of the tank, electric heaters as herein specified. CONTRACTOR shall supply 480-volt AC,3-phase, 60 Hz, Calrod immersion heaters as manufactured by General Electric Company, with a corrosion-resistant metallic flange and as called for in this Section. The heater elements shall have inconel sheaths and shall be equipped with corrosion-resistant metallic NEMA-4 terminal boxes. Each heater is to be supplied with an overheat thermocouple. CONTRACTOR shall also supply an overheat temperature controller which will convert the thermocouple output signal to an output contact (normally closed, open on increasing temperature) that will prevent damage by high heater-sheath temperatures. The thermocouple leads shall be of sufficient length to reach the overheat temperature controller. The output contacts will be wired (by others) to deenergize the heaters.

c2. CONTRACTOR shall also furnish a temperature controller for the heaters, which shall be activated by a sensing bulb to be located in a thermowell (location and type to be determined by CONTRACTOR so that optimum tank heater control characteristics are obtained). The overheat temperature controller and the temperature controller shall be mounted by CONTRACTOR on the tank near the heaters in a corrosion-resistant metallic NEMA-4 enclosure.

c3. The heaters shall be located near the bottom of the tanks and installed by CONTRACTOR through the sides of the tanks with necessary provisions so that elements are accessible and removable without draining the tanks and so that the maximum allowable sheath temperatures are not exceeded. CONTRACTOR shall furnish auxiliary contacts to actuate DISTRICT's low-temperature alarms. Contact rating shall be as specified in this Section.

202.42 Electrical Requirements:

What does this mean?

See Division 26.

202.43 Instrumentation and Control Requirements:

All necessary instrumentation and controls shall be supplied by CONTRACTOR along with necessary logic diagrams to be incorporated into DISTRICT's DCS.

203. MATERIAL REQUIREMENTS

203.1 Plate:

a. Carbon Steel: ASTM A 285 Grades B or C, A516 all grades and A 36. Alternate materials will be considered by the DISTRICT's Project Engineers.

b. Stainless Steel: ASTM A 240 Type 304, 304L, 316, or 316L

c. Aluminum: ASTM B 209 Alloy 5454 Temper H112

203.2 Pipe:

a. Carbon Steel: ASTM A 106 Grade A or B; ASTM A 53 Grade B

b. Stainless Steel: ASTM A 312 or ASTM A 376, Grades TP304, TP304L, TP316, and TP316L

c. Aluminum: ASTM B 241 Alloy 6061-T6

SECTION 441130

WET FLUE GAS DESULFURIZATION SYSTEMS

PART 1 – GENERAL

101. GENERAL TECHNICAL REQUIREMENTS

101.1. General ~~Note by JM: Needs to be clear in this section that there will be 2 WFGD, 2 Chimneys, 4 new fans, common reagent, and common waste processing etc.~~

a. This Section defines the design basis, performance requirements, flow modeling requirements and major component requirements for the two (2) wet flue gas desulfurization (WFGD) systems. The CONTRACTOR shall conform to the requirements of this Section as required for the Work and to the requirements indicated on the ~~design~~ reference drawings.

As stated in Section 011100, the scope of work includes two WFGD systems (one each for GGS Units 1 & 2), a common reagent processing system, a common ~~waste processing~~dewatering system, and associated facilities. Two new wet chimneys and four new booster fans will be supplied by ~~O~~others.

b. The CONTRACTOR's design and supply shall be such that components, parts, and modules shipped to the site and / or field are fabricated to the largest and most complete extent possible in the shop, consistent with good engineering practices and to the maximum dimensions allowed by shipping limitations. The amount of site and / or field work and welding shall be minimized. ~~CONTRACTOR shall note that this item (Degree of shop fabrication completed) is included as one of the Evaluation Factors in Section II.~~

large motors and pumps, air compressors

c. For systems and facilities included in the scope of work contained herein, the design, configuration and layout including platforms, stairs, equipment and component removal pathways and hatches shall facilitate safe and efficient operations and maintenance. The CONTRACTOR shall provide all platforms and stairs for appropriate access to and egress from all areas, both indoors and outdoors, requiring access for operation and maintenance. These areas include, as a minimum, access to man-doors, valves, operators, drives, expansion joints, test ports, instrument connections and observation areas. The CONTRACTOR shall provide jib cranes, monorails, and hoists that are required to service equipment and remove any tank access doors and man-hole covers. Lifting equipment and platforms ~~to~~for agitators shall be by the CONTRACTOR. Access shall be provided for internal inspection of the flue gas path including ducts, expansion joints and all absorber internals.

d. CONTRACTOR shall lay out, arrange, and size all trenches and sumps required to collect operating and maintenance drains, flush water, and washdown water from all CONTRACTOR equipment, piping, valves, and process areas. CONTRACTOR and DISTRICT's Project Engineer shall mutually agree on the arrangement and sizes of trenches and sumps.

e. CONTRACTOR shall supply automatic and manually initiated flush and drain connections for all limestone slurry, recycle, bleed, and underflow piping systems. Drain and flush valves by the CONTRACTOR shall be equipped with air operators equipped with air regulators to adjust the speed of operation of the valve. The drains shall be adequately sized and be routed to WFGD tanks, sumps and drain trench system. Drains shall be provided at all low points. Piping between the CONTRACTOR'S ~~makeup~~reclaim water system and the flush connections and between the drain connections and the discharge terminal locations shall be by CONTRACTOR.

A bridge crane and truck loading shall be provided to service the recirculation pumps, motors, and gearboxes.

f. As detailed herein, the WFGD systems shall contain features that will allow integration with possible future CO_2 capture systems.

g. For systems and facilities included in the scope of work contained herein, the equipment and components shall be properly protected from the environment and ambient temperature conditions as specified herein.

h. Each new chimney will be operated in a wet condition and the WFGD systems shall be designed to treat 100% of the specified flue gas volume without flue gas reheat or flue gas bypass.

i. CONTRACTOR shall reuse reclaimed water to the largest extent possible. Makeup water will be made available by the DISTRICT. ~~CONTRACTOR shall note that this item is included in the Evaluation Factors in Section H.~~ The required volume of makeup water shall be specified.

j. CONTRACTOR'S design of absorber building structures, piping, and pipe supports shall consider the differential movement between the absorber and the building steel due to wind, seismic, and thermal forces.

101.2. General Arrangements and Process Flow Diagrams

a. CONTRACTOR's equipment shall be located in general accordance with the available area shown on the drawings as specified herein. Each WFGD system shall be located downstream of the new induced draft booster fans and upstream of a new chimney. The locations of the chimneys, reagent unloading facility, pipe racks, roads and major WFGD structures have been established by the DISTRICT in consideration of construction requirements, plant access considerations, and possible future CO_2 capture equipment. The CONTRACTOR is encouraged to optimize equipment arrangements within the areas indicated on the site general arrangement drawing. ~~CONTRACTOR shall note that this time is included in the Evaluation Factors in Section H.~~

b. Reference general arrangement drawings showing underground interferences, available pipe route corridors and necessary access are provided in Section I ~~of the DISTRICT's General Conditions~~ Contract Drawing and Data Requirements.

~~c. Reference process flow diagrams (PFD's) showing the systems and subsystems of the scope of work contained herein are provided in Section I of the DISTRICT'S General Conditions. These PFD's illustrate the basis of the bid. Modification of the PFD's are acceptable provided the same functionality and redundancy is provided.~~

~~d.~~c. As the general arrangements for systems and facilities included in the scope of work contained herein, are developed, variations and modifications to CONTRACTOR's arrangement may be necessary. Such modifications shall be effected at no additional cost to the DISTRICT as long as no material increase is necessary. ~~REVISED~~

102. WFGD SYSTEMS DESIGN

102.1. Design and Operating Data

a. For systems and facilities included in the scope of work contained herein,~~-~~ systems shall be designed for the operating conditions specified including the Design Fuel Analyses, the Limestone Analysis, Make-Up Water Analysis, and WFGD Inlet Gas Analysis as specified herein. The WFGD systems, reagent preparation system, and ~~waste processing~~dewatering system shall be designed and constructed such that all performance guarantees specified shall be met for operation with the full range of fuels and limestone quality specified herein.

b. For systems and facilities included in the scope of work contained herein,, the systems shall be designed to treat flue gas created from firing the ~~coal with maximum sulfur based on the~~ following fuel being burned in the units.

Units ?

Design Fuel Analysis

	Design Fuel
Carbon	51.46
Hydrogen	3.67
Nitrogen	0.73
Sulfur	0.75
Oxygen	10.47
Chlorine	0.01
Fluorine	0.01
Moisture	27.10
Ash	5.80
HHV (Btu/lb)	8,963979

HHV looks to be light.

c. Mine data for fuel and ash for individual fuels which are candidates to be blended or fired independently in Units 1 and 2 are contained in this Section, ~~Exhibit~~Attachment 2. The range of SO_2 in the coal will be between 0.7 lb SO_2/mmBtu and 2.26 lbs SO_2/mmBtu. The GGS units will operate firing any of these fuels.

c1. Th~~ise coal~~design fuel analysis has a sulfur content representative of the expected sulfur for the coal to be burned at GGS. This coal shall be used to determine typical operating conditions at GGS and to estimate expected performance.

d. Operating Scenarios:

d1. ~~The operating scenarios for GGS Units 1 & 2 change in the future.~~ Currently, the Units operate at base load with less than 20~~{LATER}~~ hot starts (off-line for less than 48 hours) and ~~{LATER}~~ cold starts per year per unit. ~~In the future, the Units could cycle between minimum load and MCR load with {LATER} hot starts and {LATER} cold starts per year per unit. The design of the systems included in the scope of work contained herein shall consider both current and future operating scenarios.~~

e. Load:

e1. ~~Maximum Continuous Rating~~ Unit Rating of Generating Equipment (~~MCR~~URGE load) is the ~~permitted maximum heat input to the boiler~~ operation with valves wide open, with a string of high pressure heaters out of service for Unit 1 (one HP heater for Unit 2), and with turbine throttle pressure controlled as required between 2,400 to 2,520 psig. ~~IS THIS CORRECT?~~

e2. ~~Full~~ URGE load shall be the maximum load that the Units currently operate at.

e3. Intermediate load shall be selected to be between minimum load and ~~full~~ URGE loads.

e4. Minimum load is 35% of ~~full load~~URGE load. ~~IS THIS CORRECT?~~

f. Equipment sizing shall be based on parameters included in the table below.

Flue Gas Conditions	
	Design Fuel and ~~MCR~~URGE Load

Check all of the values in this table.

	GGS Unit 1	GGS Unit 2
URGE Load, MW	705	745
Heat Input to Boiler (mmBtu/hr)	6,988	7,322
Design SO_2 Inlet Loading (lb/mmBtu)	1.669	1.669
Economizer Outlet O_2 (% O_2 on a wet basis)	3.42	2.84
Total Leakage Upstream of WFGD (%)	16.0	23.4
Temperature @ WFGD Inlet (°F)	355	336
Pressure @ WFGD Inlet (in. w.g.)	+9	+9
Calculated Gas Flow @ WFGD Inlet (acfm)	3,~~170,193~~167,636	3,~~341,043~~338,305
Calculated Gas Flow @ WFGD Inlet (lb/hr)	~~8,441,808~~8,434,725	~~9,105,522~~9,097,772
Calculated Flue Gas Composition @ WFGD Inlet		
N_2, %	71.8~~13~~	~~71.98~~72.00
O_2, %	5.80	6.22
CO_2, %	11.~~49~~48	~~11.16~~11.15
H_2O, %	10.8483	~~10.58~~10.57
SO_2, ppmv, wet	~~626~~625	~~608~~607
SO_3, ppmv, dryd (@3%O_2) (without SCR)	2.0 ~~ppmvd (@3%O_2)~~	2.0 ~~ppmvd (@3%O_2~~
SO_3, ppmv, dry (@3%O_2) (with SCR)	10.0	10.0
NH_3, ppmv, dry (@3%O_2) (without SCR)	0	0
NH_3, ppmv, dry (@3%O_2) (with SCR)	2.0 ~~ppmvd (@3%O_2)~~	2.0 ~~ppmvd (@3%O_2~~
Particulate emission, lb/mmBtu	0.015	0.015
Particulate emission, lb/hr	~~119~~108	~~119~~114

Note: The data in the table above is based on +1" w.g. at the chimney breech. This can vary between +1" w.g. and -2.0" w.g.

g. Filterable particulate matter in the flue gas leaving the boiler will be removed by the DISTRICT's reverse air baghouse prior to entering the WFGD system. CONTRACTOR's equipment shall be designed to operate in a continuous manner with no loss of SO_2 removal performance for an expected particulate loading defined above, as well as during occasional upsets in operation of the particulate collector when the efficiency will drop below the expected value.

h. As previously noted, CONTRACTOR's equipment shall be designed to accommodate the installation of ~~an~~ **hot-side, high-dust** SCR system on each GGS unit.

Location	Absorber Inlet and Upstream Ductwork	CONTRACTOR-Supplied Absorber	CONTRACTOR-Supplied Absorber Outlet Ductwork and Downstream Ductwork
Excursion condition due to station blackout and loss of station power except for battery backup	For 0 to 30 minutes 750°F and -15 in. w.c./+15 in. w.c. For the next 30 minutes 650°F and -15 in. w.c./+5 in. w.c. For each subsequent 30 minute period the temperature will be 50°F lower than the previous and -15 in. w.c./+5 in. w.c.	For 0 to 30 minutes 180°F with emergency quench system in operation and -15 in. w.c./+25 in. w.c. For each subsequent 30 minute period the temperature will be 180°F and -15 in. w.c./+5 in. w.c.	For 0 to 30 minutes 180°F with emergency quench system in operation and ± 10 in. w.c. For each subsequent 30 minute period the temperature will be 180°F and ± 5 in. w.c.

Assume baghouse in bypass. Full ash load through system.

why was this deleted?

~~j5.Optional continuous operating design parameters for flue gas path are as follows:~~

~~Location~~	~~Absorber Inlet and Upstream Ductwork~~	~~CONTRACTOR-Supplied Absorber~~	~~CONTRACTOR-Supplied Absorber Outlet Ductwork and Downstream Ductwork~~
~~Continuous with CO_2 capture equipment installed between WFGD systems and new chimneys~~	~~40°F to 180400°F -55 in. w.c./ +25 in. w.c.~~	~~40°F to 180°F -55 in. w.c./ +25 in. w.c.~~	~~40°F to 180°F -55 in. w.c./ +25 in. w.c.~~

j6.j5. The 180°F temperature listed above is the ~~target~~design temperature for the flue gas with the emergency quench system in operation.

j7.The above continuous and excursion design parameters are based on the DISTRICT providing NFPA furnace implosion protection for the Units.

~~j8.~~j6. ~~The above continuous and excursion design parameters are based on flue gas pressure and temperature.~~

~~j9.~~j7. The flue gas path beginning at the CONTRACTOR's ductwork terminal location shall be designed to comply with NFPA 85 requirements ~~as they apply to the booster fans. CONTRACTOR shall evaluate~~ for both normal operating and excursion pressure and temperatures. ~~through each Unit's entire flue gas path beginning at the CONTRACTOR's ductwork terminal location. DISTRICT will provide CONTRACTOR with design criteria for existing gas path equipment and ductwork. CONTRACTOR shall provide information for booster fan operations, control features and required controls interfaces to the DISTRICT's existing controls.~~

102.2. Systems Operation

a. The systems and facilities included in the scope of work contained herein shall be designed and constructed to operate at URGE load or any specified partial load over a design life of 30 years with normal maintenance required and maximum availability.

b. The systems and facilities included in the scope of work contained herein shall be designed to achieve a high availability and low forced outage rate as defined herein.

c. The units are currently operating two years between major outages, each of which is normally scheduled for 6 weeks duration. – The systems included in the scope of work contained herein shall be designed for installation such that the DISTRICT does not have to take any additional outages or increase the normally scheduled outage durations. CONTRACTOR shall note that this item is included in the Evaluation Factors.

d. The systems and facilities included in the scope of work contained herein shall be designed for continuous operation over the range of conditions specified herein and any operation during startup and transient conditions. CONTRACTOR shall note that gas temperature, pressure, flow, and constituents will change considerably during load changes for each of the units.

e. The systems and facilities included in the scope of work contained herein shall produce ~~disposal wall~~-board grade gypsum for individual and dual unit operation with a target solids content of 90%.

f. The DISTRICT will provide make-up water at CONTRACTOR's terminal location for use in the ~~absorber,~~ the emergency quench system, ~~reclaim water,~~ and mist eliminator wash. The water analysis is specified in ~~Exhibit~~ Attachment 4 herein. The CONTRACTOR shall provide the piping systems necessary to supply the required water to the required equipment.

g. Reclaim water from the dewatering system shall be returned to each absorber or reagent preparation area. The reclaim water shall be returned on a 24-hour basis, regulated by the demand of each WFGD system. Reclaim (surge) capacity shall be provided by CONTRACTOR.

~~h.CONTRACTOR shall provide a system water balance in the proposal.~~

103. EQUIPMENT REDUNDANCY

103.1. The systems and facilities included in the scope of work contained herein shall be designed so that ~~a~~the failure of a component shall not cause a system to be taken off-line for service. For some tanks or components, an installed spare will not be required.

103.2. Below is a table detailing the equipment redundancy requirements that must be met by the CONTRACTOR.

ABSORBER AREA	
Absorber Module	1 x 100% per Unit
Absorber Spray Levels	N operating plus 1 Spare level per Absorber
Absorber Recycle Pumps	One per spray level
Absorber Recycle Tank Agitators	Design mixing and suspension must be achieved with any one agitator out of service
Oxidation Air Compressors	2 x 100% per Absorber

Check if this is necessary. One should be sufficient.

ABSORBER AREA	
~~Flush Water Pumps~~	~~2 x 100% per Absorber~~
Emergency Quench Pump (Diesel driven)	2 x 100% per Absorber
Absorber Bleed Pumps	2 x 100% per Absorber
ME Wash Water Tank	1 x 100% per Absorber
ME Wash Water Pumps	2 x 100% per Absorber
Hydroclone Cluster	1 x 125% per Absorber
Hydroclone Underflow Tank	1 x 100% per Hydroclone Cluster
Hydroclone Underflow Agitator	1 x 100% per Hydroclone Underflow Tank
Hydroclone Underflow Pumps	2 x 100% per Hydroclone Underflow Tank
REAGENT PREPARATION AREA	
Wet Ball Mills	2 x 100% per Station
Limestone Silo	1 x 100% per Wet Ball Mill
Limestone Weigh Feeder	1 x 100% per Wet Ball Mill
Mill ~~Slurry~~Product Tank	1 x 100% per Wet Ball Mill
Mill ~~Slurry~~Product -Tank Agitator	1 x 100% per Mill ~~Slurry~~ Product Tank
Mill ~~Slurry~~Product -Pumps	2 x 100% per Mill ~~Slurry~~ Product Tank
Wet Ball Mill Classifier	1 x 125% per Wet Ball Mill
Limestone Slurry Tanks	2 x 100% per Station
Limestone Slurry Tank Agitator	1 x 100% per Limestone Slurry Tank
Limestone Slurry Feed Pumps	2 x 100% per Limestone Slurry Tank
Limestone Slurry Feed Loops	2 x 100% per Unit
Maintenance Slurry Storage Tank	1 x 100% Station Capacity
Maintenance Slurry Storage Agitator	1 set ~~x~~ constituting 100% ~~per Maintenance Slurry Tank~~
Maintenance Slurry Storage Pumps	2 x 100% per Maintenance Slurry Tank
GYPSUM DEWATERING AREA	
Flush Water Pumps	**2 x 100%**
Reclaim Water Tanks	2 x 50% per Station
Reclaim Water Pumps	2 x 100% per Reclaim Water Tank
Filter Feed Tank	2 x 50% 24 hour Station Capacity
Filter Feed Tank Agitator	1 x 100% per Filter Feed Tank
Filter Feed Pumps	2 x 100% per Filter Feed Tank
Belt Filter Trains	2 x 100% per Station
Filtrate Feed Pump	1 x 100% per Belt Filter Train
Filter Vacuum Pump	1 x 100% per Belt Filter Train

Can either absorber be emptied into this tank?

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'Make Right' or Unlimited Liability Performance Guarantees for Each Unit

Guarantee Required	Guarantee Value	Test
SO_3 Removal Efficiency	Guarantee % Removal value is by CONTRACTOR	A & B
HCl Removal Efficiency	Guarantee % Removal value is by CONTRACTOR	A & B
Total Non-Mercury Metals Concentration	Maximum of 40 lb/TBtu	A & B
Gypsum Oxidation Level	~~99+%~~	A & B
Ball Mill Capacity and Grinding Fineness	95% through 325 mesh ~~20 tons/hr/unit~~ ~~Design for~~at throughput of 40 tons/hr	A & B
Noise	≤ 85 dBA @ 1 meter	Test A
~~Optional SO_2 Outlet Concentration~~	~~≤ 10 ppm SO_2~~	~~A & B~~

b. Absorber wastewater blowdown rate

The following performance guarantees are associated with specific Remedies and/or Liquidated Damages as detailed in the Commercial Terms and Conditions. ~~NOTE: can't find remedies and /or ld's~~

Performance Guarantees for Each Unit. Refer to Commercial Terms and Conditions for Remedies for Failure to Comply

Guarantee Required	Guarantee Value	Test
Flue Gas Total Pressure ~~drop~~ Drop (IWC) from CONTRACTOR's Inlet Ductwork Flange through CONTRACTOR's connection to Chimney Breeching	Guarantee Value is by CONTRACTOR	A
FGD Power Consumption (kW) Reagent Preparation/Dewatering Power Consumption (kW)	Guarantee Values ~~is~~ are by CONTRACTOR	A
Maximum Limestone Consumption & Limestone Stoichiometric Ratio	Guarantee Value is by CONTRACTOR (lb/hr). Guarantee Value verified by using Limestone Stoichiometric Ratio	A & B
~~Disposal~~ **Wall-Board** Grade Gypsum		A & B
Minimum Solids Content	90%	
Minimum Sulfate Content	95%	
Maximum Sulfite Content	0.5%	
Maximum $CaCO_3$ Content	1.5%	
Maximum SiO_2 Content	1.~~0~~5%	
Total Water Soluble Salts (2)	~~600~~ **100** ppm	
Mass Mean Particle Size	20 – 75 microns	
Equivalent Availability Guarantee (12	Equivalent Forced Outage	Between

Was this a CO_2-related requirement? If so, why removed?

Performance Guarantees for Each Unit. Refer to Commercial Terms and Conditions for Remedies for Failure to Comply

Guarantee Required	Guarantee Value	Test
months after successful completion of Test A for each Unit)	Rate < 1.0%	Successful Completion of Tests A & B for each Unit

104.2. SO_2 Outlet Concentration: The maximum SO_2 outlet concentration of the absorber shall be guaranteed as specified herein for each unit with the flue gas conditions as specified herein without the use of performance enhancing additives such as organic acids. This outlet concentration shall be met at all operating ~~loads while~~ firing the full range of fuels, as specified herein.

~~104.3. (I don't understand this option. What does it buy us, when the stated limit above is a "guaranteed" value?) Optional SO_2 Outlet Concentration: An optional SO_2 outlet concentration of < 10 ppm shall be guaranteed as specified herein for each unit with the flue gas conditions as specified herein without the use of performance enhancing additives such as organic acids. This optional outlet concentration shall be met at all operating loads while firing the full range of fuels, as specified herein.~~

~~104.4.~~104.3. Filterable ~~Particulate Removal: For each unit, the filterable particulate emission level in the chimney~~ shall not exceed the level at the absorber inlet. This emission level shall include fly ash, calcium salts, ammonia and other inerts or materials, except water in uncombined form, that are or have been airborne, and exist as liquid or solid at standard conditions. The emission level shall be met at all operating points and be based on the heat input to the boiler at that operating load.

104.4. Condensable Particulate Removal: For each unit, the condensable particulate emission level in the chimney shall not exceed the level guaranteed by the CONTRACTOR . The emission level shall be met at all operating points and be based on the heat input to the boiler at that operating load.

104.5. Pressure Drop: The CONTRACTOR shall guarantee a total pressure drop through the WFGD system in inches of water column (IWC) for the ~~MCR~~URGE load flue gas flow, while operating at the maximum allowable mist eliminator pressure difference. This value shall be calculated from the DISTRICT/CONTRACTOR interface of the WFGD absorber inlet battery limit to the absorber module outlet duct **interface** at the chimney breeching. The mist eliminator and all ducts shall be in a normal operating condition based on CONTRACTOR's recommended mist eliminator cleaning cycle. CONTRACTOR shall provide pressure taps, as needed, for the guarantee test and show the location of the taps on their drawings.

104.6. Mist Eliminator Performance: For each absorber, the Maximum Entrained Moisture Carryover as measured in a demonstration model test shall be per the table in Article 104.1.~~an average of no more than 0.070 grains/scf~~ based on the absorber cross section at the mist eliminator level and the design flue gas velocity. The flow model shall include the exact type and configuration of mist eliminators being proposed **and shall be tested with and without the mist eliminator sprays in service.**

For each absorber, the velocity distribution at the downstream side of the mist eliminator as measured in a field test shall be an average of no more than 15.0% RMS based on the absorber cross section at the mist eliminator level and the design flue gas velocity. CONTRACTOR shall provide 8 evenly spaced test ports at the test location for the use during the velocity distribution test, and guide rods to be used to support the velocity probe within the absorber vessel. A minimum of 48 sample points shall be used to measure the velocity distribution.

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~~104.12.~~104.13. Gypsum Oxidation: For each absorber, the Oxidation Level of the Gypsum Product shall be per the table in Article 104.1.~~aequal or greater than 99.0%~~ at ~~Maximum Continuous Load~~ MCRURGE?-load and design SO_2 operation. Oxidation Level shall be calculated by dividing the total moles of Calcium Sulfate ($CaSO_4 \cdot 2\ H_2O$) by the sum of the total moles of Calcium Sulfite ($CaSO_3 \cdot \frac{1}{2}\ H_2O$) and Calcium Sulfate in the gypsum product from the absorbers, expressed as a percentage.

~~104.13.~~104.14. ~~Disposal~~ Wall-Board Grade Gypsum: For each absorber, the minimum solids content shall be per the table in Article 104.1.~~bequal or greater than 90% solids~~ at MCRURGE load and SO_2 operation. The gypsum quality shall be tested as specified below.

I thought it was "Disposal" grade.

Gypsum Quality Test Methods

Guarantee Required	Test Method
Minimum Solids Content	ASTM C471
Minimum Sulfate Content	ASTM C471 or EPRI L4
Maximum Sulfite Content	EPRI M3
Maximum $CaCO_3$ Content	Combined ASTM C25/TAPPI T624 or EPRI N3
Maximum SiO_2 Content	ASTM C471
Total Water Soluble Salts (2)	Mutually agreed upon method
Mass Mean Particle Size	Laser Diffraction, e.g. MICROTRAC or MALVERN

~~104.14.~~104.15. Ball Mill Fineness: Ball mill capacity and fineness – CONTRACTOR shall guarantee ~~the~~ a ball mill capacity of 40 tons per hour while producing a product particle fineness of 95% through 325 mesh.

~~104.15.~~104.16. Equivalent Availability Guarantee

a. CONTRACTOR shall guarantee the Equivalent Availability of two sets of equipment, the first set of equipment being the WFGD system brought on-line first and the reagent preparation/dewatering equipment, the second set being the WFGD system that is brought on-line second. The EAF shall be calculated and compared to the guarantee value for these two sets of equipment independently. Equivalent availability terms: ~~reference to terms associated with the~~ equivalent availability is defined as follows ~~below~~:

a1. "Equivalent Availability Factor," EAF = (PH-POH-FOH)/ (PH- POH).

~~a2."Equivalent Forced Outage Rate," EFOR = FOH/(PH-POH).~~

a3.a2. "Planned Outage Hours," POH = the time in hours during which the system ~~(for each unit ?)~~ is removed from service for planned outages, such as scheduled overhaul or inspection.

a4.a3. "Forced Outage Hours," FOH = the time in hours during which, due to the occurrence of a component failure or system condition, each WFGD system is not capable of achieving outlet SO_2 guarantee at the DISTRICT's required capacity over the specified range of loads and SO_2 content. The DISTRICT

f. The absorber building shall enclose the oxidation air compressors, recycle pumps, recycle tank agitators, hydroclones, ~~and~~ hydroclone underflow ~~tank~~pumps~~s~~, mist eliminator wash tank and pumps, bleed pumps, and emergency quench pumps.

g. Materials:

g1. The absorbers will be exposed to fluorides, chlorides, sulfur dioxide, sulfuric acid, sulfurous acid, water, ammonia slip and other corrosive constituents. The absorber will also be exposed to temperature variations, vibration, surface impingement and intermittent wet/dry conditions (especially at the flue gas inlet to the absorber). The absorber shall be designed to minimize crevices subject to corrosion, slurry solids buildup, scaling, general corrosion, pitting attack, stress corrosion, vibration and other potential problems. All attachments to the inside of the absorber shall be designed such that no crevices remain. Faying surfaces, i.e. metal to metal contact areas, shall be designed to allow fillet welds on all sides.

penetrations and

g2. CONTRACTOR shall recommend the appropriate materials of construction for the expected operating conditions and all vessel parts and storage tank internals subject to corrosive or erosive conditions shall be made of materials especially suitable to withstand such conditions. The absorber and all other system materials shall be capable of withstanding chloride concentrations of up to ~~1230,000(Is this still the number??)~~ ppm. Except where noted otherwise herein, the wetted surfaces of the absorber vessels shall be a minimum of stainless steel, alloy, tile-lined concrete or lined carbon steel.

Should we specify galvanized rebar in liquid-containing portion of absorber vessels?

g3. The wet/dry interface and the first 10 feet of inlet duct shall be solid alloy C-276 material (UNS# N10276) and shall be designed to angle downward into the absorber.

g4. The integral recycle tank shall be the same material as the rest of the absorber. CONTRACTOR shall provide a vinyl-ester coating or equivalent to protect the base metal from maintenance activities (such as cleaning out solids with a carbon steel shovel). The coating shall cover the floor and a 3' height of the tank walls.

g5. The absorber wetted surfaces starting at the mist eliminator supports and beyond, including absorber top, cone, elbow, and duct to chimney breech, will experience lower pH than surfaces below. CONTRACTOR shall install materials that are suitable for the low pH environment. These surfaces shall be FRP or clad C-276. DISTRICT will consider other materials as an option.

Only for Advatech vessels?

g6. ~~Metal~~Absorber surfaces ~~and~~ for all CONTRACTOR supplied vessels and tanks shall be abrasive blasted in the shop to remove mill scale. Absorber and tank bottoms shall be welded or tile-lined. All vessels shall be designed in accordance with ASTM 4618-92 as well as all other codes and standards listed in this Specification.

g7. Absorber wetted internals such oxidation air lances and supports, stiffeners, nut and bolts, spray piping and pipe supports, support grid below the first spray level, and mist eliminator piping and supports and holding rods, etc., shall be constructed of corrosion-resistant alloy material or FRP.

g8. The external stiffeners for the absorber and outlet ductwork shall be compatible with the base absorber material. If the absorber is stainless or alloy, the stiffeners shall be stainless steel at a minimum.

g9. All tools (grinders, brushes) used on interior metal surfaces shall be a material compatible with the base metal. All welds shall use filler materials that are of equal or greater corrosion resistance.

h. The absorber module shall be constructed to form a watertight and gastight envelope from the module inlet to the module outlet. Any penetrations of the module shell required for piping connections or accessories shall be sealed to keep the module leaktight.

i. All internal piping, floors, trays, and gratings within the absorbers including the mist eliminators shall be designed for a minimum live load of 100 psf, in addition to dead load and construction loads, and shall be fabricated of corrosion- and erosion- resistant material.

j. Absorber modules shall be freestanding. The module shall be designed to accommodate pressure and vacuum loads, piping forces and moments, environmental conditions, seismic conditions, and all other loads imposed on the module. Reinforcement or bracing shall be adequate to minimize module shell vibration resulting from any condition, which possibly could occur within the absorber or ductwork.

k. The welding process to be used for welding alloy materials of construction should contribute low heat input, good fusion and produce smooth finish weld surfaces. GMAW pulsed arc is recommended with appropriate welding materials. Materials containing chloride or other constituents capable of inducing stress corrosion in stainless steel are prohibited. CONTRACTOR shall take extra precautions in handling alloy materials.

l. Weld Seams For Vessels: All interior weld seams shall be free from surface defects including weld slag, weld splatter, overlap, undercut, pinholes, sharp edges, and other such conditions which could interfere with the coating system adherence. All weld interior seams shall be ground smooth and blended in accordance with NACE RP0178-2003 "Fabrication Details, Surface Finish Requirements and Proper Design Considerations for Tanks and Vessels to be Lined For Immersion Service", Weld Preparation Designation C or better.

m. Access Doors: Heavy-duty, quick opening davit style, leakproof 36"x 36" (minimum size) access doors shall be provided at grade, tray and spray levels, mist eliminator, mist eliminator wash spray levels and all other areas where access for inspection and maintenance is required. The access doors for the absorbers shall be constructed of the same material as the absorber or higher. Doors shall be provided with external latches and tightening devices, which allow for gasket shrinkage and still maintain zero leakage. Doors shall be provided with means to lock in the open position to prevent accidental closing with maintenance personnel inside. Provisions shall be included inside the absorber vessel to facilitate the installation of maintenance platforms and scaffolding for access to absorber internals.

n. Spray nozzles shall be connected to the spray headers with bolted flanged fittings for easy removal and installation. Victaulic couplings are not acceptable.

o. Spray nozzles shall be constructed of silicon carbide.

p. External spray piping shall be constructed of FRP.

q. The piping shall be designed to minimize internal plugging and external solids buildup and scaling. Internal piping including branches off of main header shall be installed with flanges so all sections can be removed and replaced through the tower/tank openings.

r. The piping shall be suitably reinforced to minimize vibration.

s. Rod out connections shall be provided for each spray header branch line.

t. The absorber shall include provisions for the installation of insulation and lagging, as required. Furnishing and installation of insulation and lagging will be by the CONTRACTOR.

v. ~~u.~~ WFGD Access and Equipment Support Structure:

u. Additional penetrations shall be provided with bolted covers to allow passing extension cords, air lines, communications lines, etc. into the vessel to support off-line maintenance activities.

i. CONTRACTOR shall design the mist eliminator for no gas "sneak by" between the support rim and the absorber wall or between any of the mist eliminator sections. Mist eliminator sections shall be suitably restrained to prevent sections from lifting and allowing gas to bypass the mist eliminator.

j. CONTRACTOR shall include provisions for continuously monitoring pressure drop across each mist eliminator stage.

k. CONTRACTOR shall include in the spare parts list the recommended spare mist eliminator elements for each stage of the absorber module for the DISTRICT's spare parts inventory.

l. The WFGD system shall use makeup water for mist eliminator washing from the CONTRACTOR's mist eliminator wash water tank.

201.5. The CONTRACTOR shall furnish the mist eliminator wash water tank, pumps, wash headers and piping, nozzles and associated instrumentation and controls required for this project.

201.6. Emergency Quench Systems

a. CONTRACTOR shall furnish all necessary equipment including two 100% capacity diesel driven pumps, piping and nozzles to provide a complete and operable emergency quench water system per absorber. The emergency quench systems shall be designed to reduce flue gas temperature to protect downstream equipment, such as the absorber, mist eliminators, ducts and the chimney liners, in the event of a station blackout, largest single air heater out of service, recycle pumps out of service, or any condition that results in high flue gas temperature in the absorber. The systems shall be designed to be single failure proof and be capable of automatic or manual initiation and with manual or low supply water tank level stopping.

Check this.

b. It is CONTRACTOR's responsibility to determine the appropriate emergency quench water flow rate and duration to prevent damage to the WFGD system internals and chimney liners.

c. The system shall quench the flue gas and maintain an absorber temperature of no more than 180°F.

d. CONTRACTOR shall provide and install at least 3 temperature sensors that will initiate the quench system.

e. Quench system shall have a manual test mode so that the DISTRICT can test the quench system once per month to verify its availability for operations.

f. The DISTRICT will provide fire protection water as the normal supply of water for the emergency quench systems.

g. The CONTRACTOR shall provide tanks for storage of a backup supply of quench water. The tank can be dedicated to the quench system or serve dual purposes such as a reservoir for quench water and either mist eliminator wash water or makeup water ~~to~~ or reclaim water. The tank ~~should~~shall be sized to supply quench water for at least 30 minutes. ~~(?check that this is appropriate)~~

h. Unit 1 and 2 operating data has been provided for events that could require quench water such as Station blackout or loss of the largest air heater drive. If other data is needed, it should be requested before the bid is due.

201.7. Reagent Storage and Preparation

b. The absorber area sump(s) shall discharge to the absorber and to the maintenance tank.

b1. In the event that a tank requires maintenance, all tanks shall be designed to be evacuated by pumping out the contents using the process pumps until the minimum agitator level is reached. The remaining contents shall be evacuated by draining to the local sump using the tank drain.

b2. The requirements for sump pump design are specified ~~herein~~in Section 432143.

b3. Sump agitators shall also be provided and designed per Section 432216.

201.21. Oxidation Air Blowers

CONTRACTOR shall furnish two (2), 100% capacity oil-free compressors per ~~boiler~~ absorber unit for the application, performance and operating characteristics specified. Each packaged compressor unit shall be complete with remote control panel, provisions for remote monitoring and control and as specified herein. Materials selected shall be appropriate for the service.

201.22. Ductwork

a. Flue gas ductwork and expansion joint requirements are specified ~~herein~~in Section 051800. Dampers shall not be provided.

b. Ductwork material of construction shall be in accordance with this specification.

c. The quantity and location of all test, instrument, drains and sample ports located in the ductwork shall be subject to the DISTRICT's review.

d. Ductwork shall be arranged as required by the WFGD systems design and results of the airflow model tests, and for accessibility for monitoring and testing, use of space, and appearance for each unit.

e. The maximum operating conditions and excursion conditions are specified herein.

f. Absorber Ductwork

f1. The outlet elbow/cone of the absorber shall be designed to be able to be cut and rotated 180 degrees or 90 degrees in either direction to accommodate possible future CO_2 capture equipment without impacting the performance of the absorber and mist eliminators.

f2. The final shape of the duct shall be carefully chosen based on input from the flow model testing. The expansion joint at the chimney inlet shall be by the CONTRACTOR. The allowed spacing between WFGD absorber outlet ducts at interface points at the flanges of the stack breeching ducts as well as the size of the chimney breeching will be determined by Others.

201.23. Linings and Materials of Construction

a. CONTRACTOR shall advise its sub-vendors and subcontractors of the composition of the material being handled by their Equipment.

b. CONTRACTOR shall be responsible for the design of the shop and field-erected tanks for this project (including tank and tank liner material selection), subject to the review and approval of the DISTRICT's Project Engineer and the Consulting Engineer. Where rubber linings or specific alloy materials are called for herein, CONTRACTOR shall verify the suitability of the specified material or specify another material, but said material shall be of higher quality in regard to corrosion- or erosion-resistant performance. CONTRACTOR shall not substitute a material of lower quality. Material

Note: I don't think this will work w/ Aduatech scrubber. Maybe it could be rotated 180°, but not 90°!

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a3. Compliance with all requirements regarding Code stamping and Code certification as specified in the ASME Boiler and Pressure Vessel Code.

b. The CONTRACTOR shall furnish Code data reports of shop and /or field inspection. Such inspection shall be performed by inspectors who have been qualified in accordance with the Code requirements.

c. Documentation shall be assembled in CTOs, grouped by the scoping of systems and transferred to CONTRACTOR's commissioning group.

d. Where field assembled vessels erected by the CONTRACTOR require filling with water for testing, the CONTRACTOR shall fill such vessels with the type of water designated by the DISTRICT. After testing, the vessels shall be drained to the location designated by the DISTRICT. The CONTRACTOR shall furnish all temporary piping and hose required for filling and draining of the vessels.

305.2 Scope of Testing

a. Mechanical Completion Test Program

a1. The CONTRACTOR shall perform and successfully complete tests on all mechanical, control and electrical systems. The Mechanical Completion Tests shall include all tests as are reasonably necessary, customary or required by this specification and Industry Standards to determine that all components, equipment, sub-systems and systems comprising the scope of work function properly and within the parameters described in the Contract.

a2. The four (4) test programs for Mechanical Completion Tests that the CONTRACTOR will be required to directly perform are:

a2.1 Construction Test Program,

a2.2 Pre-Commissioning Test Program,

a2.3 Commissioning Test Program and

a2.4 Integrated Plant Test Program.

Seems redundant to Section 304.3 above.

a3. The CONTRACTOR's Construction Test Program is performed in its entirety by the CONTRACTOR. Typically, the testing and checkouts performed during this phase of commissioning are conducted to demonstrate that the installation is in accordance with the applicable codes and standards for construction and are within the parameters described in the Contract. The CONTRACTOR's Construction Test Program shall include, but not be limited to, the following types of tests and practices:

a3.1 Non-destructive examination (NDE) of welds including visual, dye penetrant, magnetic particle, ultrasonic, radiographic, etc.

a3.2 Pipeline leak checks

a3.3 Hydrostatic pressure tests per B31.1, NFPA, AWWA, etc.

a3.4 Pneumatic pressure tests

a3.5 Duct air pressure tests

a3.6 Duct vacuum pressure tests

305.3 Schedule of Testing
a. As required in Article C.W.8, no testing activities shall affect the Guaranteed Final Acceptance date.

Steam temperatures, pressures and other boiler operating parameters shall be maintained within normal operating ranges.

a6.4 Boiler Minimum Stable Load Test for four (4) hours

a6.5 Full Plant Operation

a6.6 Boiler Automatic Response from 100% to Minimum Load on a Load Rejection without tripping off line

a6.7 Boiler Response to a Runback on loss of:

a6.7.1 One Induced Draft Fan from 100% load without tripping offline.

a6.7.2 One Forced Draft Fan from 100% load without tripping offline.

a6.7.3 One Primary Air Fan from 100% load without tripping offline.

a6.7.4 One Pulverizer from 100% load without tripping offline.

a6.8 Boiler Response to Loss of Operating Feed Pump

a6.9 Boiler Coal Storage System Response complies with Material Handling System capabilities

a6.10 Other tests that are customary and as typical of Industry Standards

a7. Mechanical Completion Tests may be conducted when portions of the Work, such as cleanup of debris, painting and insulation, are not yet complete. However, in no instance shall a Mechanical Completion Test be conducted when the aforementioned exclusions could affect safety, functionality or integrity of the equipment or system being tested.

a8. Mechanical Completion Tests will be deemed complete for a component, equipment, sub-system or system when such component, equipment, sub-system or system can be operated properly without endangering personnel, causing damage to equipment, damage to support equipment or damage to the transmission system and the CONTRACTOR has provided Mechanical Completion Test documentation to the DISTRICT.

305.3 a. Construction Turnover Packages (CTOs)

At the time of completion of construction and construction testing of components, equipment, sub-systems or systems, a CTO is utilized to assemble all documentation associated with construction and construction testing for a scoped boundary. The CTO is utilized to formally control of components, equipment, sub-systems or systems within a specific scoped boundary.

b. The CONTRACTOR shall be responsible to:

b1. Determine an appropriate method of system scoping that identifies the physical boundaries for a CTO. The scoped documents provide a definitive identification of when and what components, equipment, sub-systems and systems are to be completed and packaged for released for further commissioning.

b2. Perform walk downs of the components, equipment, sub-systems and systems within the scoped boundaries of the CTO with the DISTRICT.